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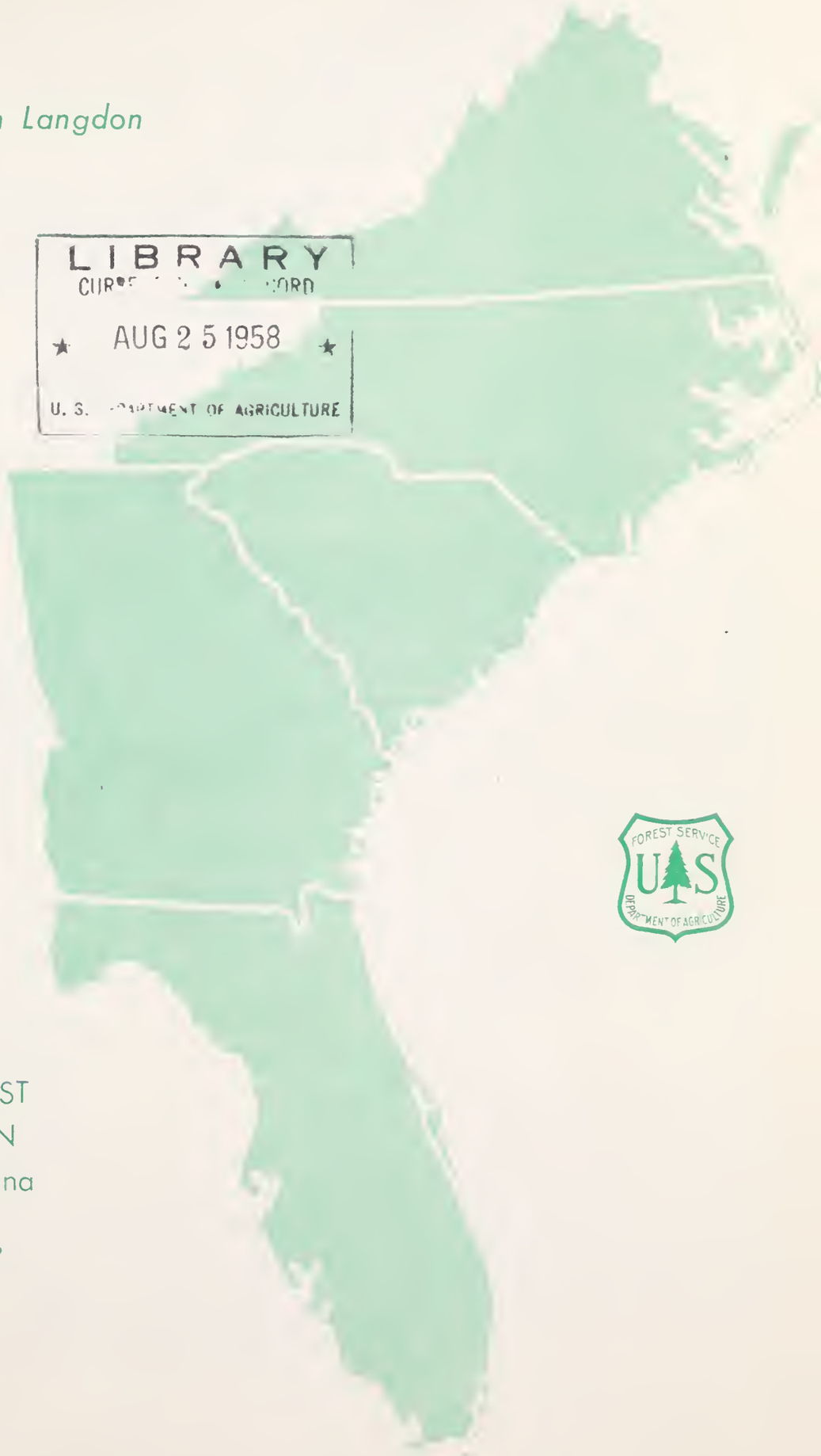

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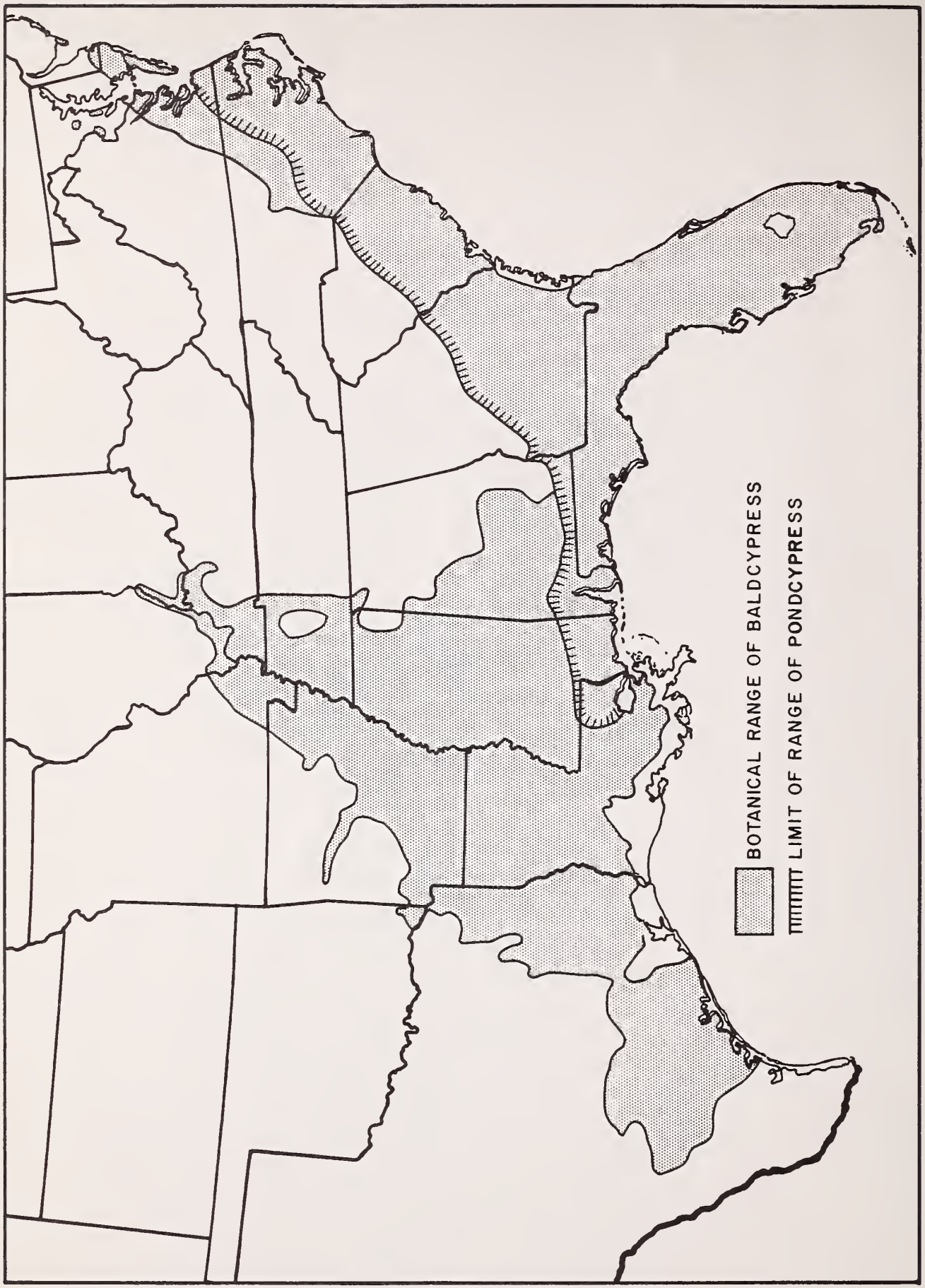
BOTANICAL RANGE OF BALDCYPRESS
LIMIT OF RANGE OF PONDCYPRESS

Figure 1.

Silvical Characteristics of Baldcypress

(*Taxodium distichum* (L.) Rich var. *distichum*)

by

O. Gordon Langdon

Southeastern Forest Experiment Station

Baldcypress *(Taxodium distichum* (L.) Rich var. *distichum (15)* — also commonly called southern cypress, gulf cypress, tidewater red cypress, yellow cypress, and cypress — is perhaps one of the most unusual trees found in the South. Baldcypress grows on the wettest sites, lives for centuries, and produces a very durable wood.

The natural range of baldcypress extends along the Coastal Plain from southern Delaware to south Florida and west through southeastern Texas, almost to the Mexican border. Inland, in the Coastal Plain, it grows along the many streams of the Southeastern States and north in the Mississippi Valley to southeastern Oklahoma, southeastern Missouri, southern Illinois, and southwestern Indiana *(11, 15)* (fig. 1). Locally, baldcypress is confined to river and interior swamps, wet depressions, spring-seeps, and stream banks *(16, 24)*.

HABITAT CONDITIONS

CLIMATIC

Baldcypress grows under a considerable range of climatic conditions, but the tree reaches its maximum development in the warm, humid climate of the South *(3, 29)*. Although natural range of baldcypress does extend into regions where winters are fairly severe, very little seed matures in the extreme northern part of the range *(16)*. Individual trees planted as far north as Massachusetts and Michigan show that baldcypress will live where the temperature falls to –20° F. *(9)*.

EDAPHIC

Baldcypress is usually restricted to very wet soils consisting of mucks, clays, or the finer sands where moisture is abundant and fairly permanent. It cannot grow in poor, dry, sandy soils *(3, 9)*. Although its best growth has been found on deep, moist, fine sandy loams with moderately good drainage, baldcypress rarely occurs on such sites, presumably because of water requirements for seed germination and possibly because of competition from the more tolerant hardwood species *(12, 16)*.

Baldcypress is apparently not limited to particular soils because of soil reaction, for it occurs on Plummer and other swamp soils that vary from acid to alkaline *(7)*.

PHYSIOGRAPHIC

More than 90 percent of the natural baldcypress stands are found on flat or nearly flat topography at elevations of less than 100 feet above sea level. The upper limit of its growth in the Mississippi Valley is at an elevation of about five hundred feet. A few isolated stands are found at elevations of 1,000 to 1,750 feet bordering deep hollows on the Edwards Plateau of Texas *(9, 16)*.

BIOTIC

Baldcypress occurs both in pure stands and in mixtures with various hardwoods *(16, 21, 27)*, and is found in eight cover types of North America *(27)*.

Its chief associates are water tupelo *(Nyssa aquatica)* in the alluvial flood plains, or swamp tupelo *(Nyssa sylvatica* var. *biflora)* in the Coastal Plain swamps and estuaries *(27)*.

Other common associates are pondcypress *(Taxodium distichum* var. *mutans)*, black willow *(Salix nigra)*, swamp cottonwood *(Populus heterophylla)*, red maple *(Acer rubrum)*, Atlantic white-cedar *(Chamaecyparis thyoides)*, American elm *(Ulmus americana* var. *americana)*, green ash *(Fraxinus pennsylvanica)*, pumpkin ash *(Fraxinus profunda)*, Carolina ash *(Fraxinus caroliniana)*, waterlocust *(Gleditsia aquatica)*, redbay *(Persea borbonia)*, common persimmon *(Diospyros virginiana)*, overcup oak *(Quercus lyrata)*, and water hickory *(Carya aquatica)*.

On less moist sites or on slightly elevated ground within swamps, it may be associated with sweetgum *(Liquidambar styraciflua)*, Nuttall oak *(Quercus nuttallii)*, laurel oak *(Quercus laurifolia)*, sweetbay (*Magnolia virginiana*), loblolly pine *(Pinus taeda)*, slash pine *(Pinus elliottii)*, South Florida slash pine *(Pinus elliottii* var. *densa)*, and pond pine *(Pinus serotina) (2, 7, 16, 27, 31)*.

Baldcypress has only a few shrubby-plant associates, and these vary from region to region. For example, in south Florida they include such species as common buttonbush *(Cephalanthus occidentalis)*, stiffcornel dogwood *(Cornus stricta)*, and Walter viburnum *(Viburnum obovatum) (7)*. In contrast, the shrubby plants found with baldcypress in North Carolina include: Coast leucothoe *(Leucothoe axillaris)*, Carolina rose *(Rosa carolina)*, poison-sumac *(Toxicodendron vernix)*, stiffcornel dogwood, and possumhaw viburnum (*Viburnum nudum*) *(32)*. In many cypress swamps, ferns, vines, and epiphytes are often present and sometimes numerous *(7)*.

LIFE HISTORY

SEEDING HABITS

Flowering and fruiting. — Flower buds of baldcypress are initiated in late December or January *(22)*. Male and female flowers are borne separately on the same tree. Male flowers are minute, purple in color, and grow in drooping panicles 4 to 6 inches long at the end of the preceding year's shoots. Female flowers are inconspicuous and composed of several spirally arranged, overlapping scales, each scale bearing two ovules *(9, 12, 30)*.

These conelet-like flowers develop into cones during the first year. The cones consist of a relatively few 4-sided scales. Each scale bears two triangular seeds — both not always developed — which have thick, horny coats and irregular projecting flanges or wings along the edges *(30)*. The cones begin to lose some of their green color in September and October *(10)*, and by late October and November they mature, becoming brown and woody and measuring ½ to 1¼ inches in diameter *(9, 30)*.

Seed production and dissemination. — Baldcypress cones contain 18 to 30 seeds which ripen from October to December. The seed, together with the scales, may break away irregularly from the cone, or the entire cone may drop to the ground. Some seed is produced almost every year, and good production apparently occurs at intervals of about every 3 years *(9, 16)*.

The cones contain pockets of sticky, red, liquid resin. Probably because of the repellent effect of this resin, the seeds are seldom taken by birds, squirrels, mice, or other rodents. Because of the large size of the seed (5,000 per pound) and the relatively small wing-size, cypress seed are not dispersed by the wind. However, floodwaters spread the seed along rivers and streams, and this is the most important method of seed dissemination *(3, 8, 16)*.

VEGETATIVE REPRODUCTION

Baldcypress can reproduce by sprouts as well as by seeds *(3)*. Thrifty sprouts are generally produced from stumps of young trees, and trees 10 to 14 inches in diameter and up to 60 years of age also send up healthy sprouts, when cut during the dormant period. Stumps of trees up to 200 years old may also sprout, but the sprouts are not as vigorous and are more subject to wind damage as the stump decays. Cypress trees are often girdled 6 months to a year in advance of logging to reduce weight so that the logs will float. The stumps of these girdled trees usually do not sprout after logging *(9, 12, 16)*.

SEEDLING DEVELOPMENT

Establishment. — Seed germination usually averages 40 to 60 percent *(16)*, but it may be as low as 9 percent when conditions are poor *(30)* or as high as 87 percent when conditions are ideal *(16)*.

Under swamp conditions the best seed germination generally takes place on a sphagnum moss or a wet muck seedbed. The main requirement for germination is however an abundant supply of moisture for a period 1 to 3 months after seedfall *(16, 30)*. Water facilitates germination by allowing the hard seedcoats to swell and soften. Seeds covered with water for as long as 30 months may germinate when the water recedes. Baldcypress seeds usually fail to germinate successfully on the better-drained soils because of the lack of surface water *(16)*. The exacting requirements for moisture in early life seem to furnish the key to the whole question of baldcypress distribution *(17)*.

For seedlings of baldcypress to become established, the seed must sprout after the water recedes in the swamps, and the seedling must grow high enough the first year to stay above the floods, except for short periods *(8)*.

Early growth.—Seedlings often reach heights of 8 to 10 inches during the first season and 16 to 20 inches by the second year *(8, 16)*.

Rabbits are often attracted to young cypress seedlings and will feed heavily on them in the wintertime, causing considerable damage.[1]

Flooding is also an important factor in the early growth of baldcypress. Growth is checked when the seedling is completely submerged by flooding, but submerged seedlings have produced new shoots when the tips were exposed to the air *(31)*. Prolonged submergence, however, may cause seedling mortality *(3, 5)*.

In a test of 2-week-old potted baldcypress seedlings, the effect of varying degrees of watering on early seedling growth was strikingly demonstrated. When the soil was filled with ground water the height growth of the seedlings was 5.2 inches after 6 weeks of testing. Another group of seedlings which had a constant supply of capillary water grew 4.6 inches. A third group of seedlings, receiving a variable water supply through daily soil surface watering, grew only 2.3 inches. Completely submerged seedlings died within 5 weeks *(17)*.

SAPLING STAGE TO MATURITY

Growth and yield. — Baldcypress is noted for its long life and the large size it attains. Cypress is also popularly considered a slow-growing tree. This belief is justified for old-growth virgin timber, but not for second-growth stands *(3, 12, 16, 28)*.

Most of the very old, very large virgin baldcypress stands have now been cut. Trees in the virgin stands were commonly 400 to 600 years old, and individual trees up to 1,200 years have been found and reported in Georgia and South Carolina *(16)*. Recently in Tennessee a baldcypress called the "Tennessee Titan" was reported to be 1,300 years old, 39 feet 8 inches in circumference, and 122.5 feet tall *(26)*. The prevailing sizes of mature trees on ordinary sites were about 36 to 60 inches d.b.h. and 100 to 120 feet in height. The largest trees on these sites were 84 to 96 inches d.b.h., with a maximum of 144 inches. Maximum heights were 140 to 150 feet, and in all cases height growth culminated before diameter *(16)*.

Increases in diameter and height of second-growth stands of baldcypress are quite rapid and compare favorably with those of many bottomland hardwood species. From data collected in the 1953-54 Forest Survey of Louisiana *(28)*, averages of 10-year diameter growth for baldcypress and other trees of the Delta region of Louisiana were compared:

[1] McKnight, J. S. Unpublished data. Delta Research Center, Southern Forest Experiment Station, New Orleans, Louisiana.

D.b.h. (inches)	*Baldcypress (inches)*	*Other Delta species (inches)*
6 - 12	1.8	2.2
14 - 18	2.1	2.6
20 - 28	2.0	2.6

Similar diameter increases of 2 inches in every 10-year period have been reported (table 1) for second-growth stands in Maryland between the ages of 60 and 100 years *(16)*. There is good evidence based on the measurement of a large number of trees that diameter growth of baldcypress is practically the same under similar local situations throughout its range *(16)*.

Table 1.—*Average height and diameter of second-growth baldcypress in Maryland (16)*

Age (years)	Diameter	Height
	Inches	*Feet*
10	1.1	11
20	3.5	22
30	6.2	33
40	8.7	46
50	11.1	60
60	13.3	72
70	15.3	81
80	17.3	88
90	19.3	95
100	21.3	101

Height growth of baldcypress averages about 1 foot per year during its first 100 years (table 1). Height continues to increase at a slower rate during the next 100 years or so, when baldcypress reaches its maximum height *(16)*.

In the better cypress regions of the South, yields in virgin stands of 8,000 to 14,000 board-feet per acre were not uncommon over large tracts. Maximum yields on the most favorable sites were 50,000 to 60,000 board-feet per acre *(16)*. Yields for second-growth stands are not available.

The principal fungus disease of baldcypress is a brown pocket rot of the heartwood known as "peckiness" or "pecky cypress." This rot has been attributed to *Fomes geotropus (16)*. Some pathologists doubt that the fungus causing a soft white rot of hardwoods would also cause a brown pocket rot in cypress and suggest that it more closely resembles *Polyporus amarus* — the fungus that is responsible for pocket dry rot of incense cedar *(4)*. The pecky cypress fungus most frequently gains its entrance in the crown, and slowly works downward in the heartwood to the base of the tree *(16)*. Pecky cypress lumber is quite durable against decay (although not as durable as undamaged heart-cypress) because the fungus does not continue to develop in the wood after the tree is cut *(4, 16)*.

Several insects attack baldcypress, but none are reported as causing mortality. One insect — the cypress flea beetle *(Systena marginalis)* — has recently been causing severe discoloration of foliage in Georgia and Florida *(18, 25)*, and another — the cypress looper *(Anacamptodes pergracilis)* — has caused defoliation of cypress in Arkansas and Louisiana *(19)*. Several insects attack and bore into the wood of felled or girdled trees and cause serious degrade of lumber: the cypress bark borer *(Physocnemum andreae)* and the flatheaded baldcypress sapwood borer *(Acmaeodera pulchella)* damage the sapwood; the flatheaded baldcypress heartwood borer *(Trachykele lecontei)* and the flatfooted ambrosia beetle *(Platypus compositus)* damage the heartwood *(6)*.

Reaction to competition. — Baldcypress swamps are considered subclimax because they are held almost indefinitely in a subfinal stage of succession by edaphic and physiographic conditions and not by climatic ones *(20)*. The oak-hickory association is considered to be the climax in this region *(20)*.

The relative tolerance of baldcypress has not been definitely established. The species has been listed as very intolerant *(33)*, intermediate *(1, 16)*, and tolerant *(23)*.

The intermediate tolerance classification appears to fit most conditions. Although baldcypress seedlings often germinate in heavily shaded places, observations indicate that most successful stands start in openings rather than beneath crown canopies *(8, 32)*. For best growth, baldcypress requires a good degree of overhead light, but it is able to endure partial shading and still make persistent but less rapid growth *(16)*. In full stands baldcypress characteristically has a clean, smooth stem and small crown, readily pruning itself of branches *(16)*, but in poorly stocked stands it is characterized by a very limby condition above the butt-swell.

Baldcypress stands become stagnated because individual trees do not express dominance as crown canopies close. However, when cypress is released from this stand condition, it will respond and grow more rapidly *(5)*.

SPECIAL FEATURES

The most distinctive features of baldcypress are swollen, fluted trunks at the base of the tree and the occurrence of structures called "knees." These knees are vertical outgrowths from lateral roots, which vary from a few inches to several feet in height, depending on the average high-water level of the site. The main purpose of cypress knees appears to be one of anchorage. Although knees are commonly credited in literature as being aerating organs, the available evidence does not confirm this. In fact it appears that cypress trees grow as well without knees as with them *(3, 9, 12, 14, 16)*.

RACES AND VARIETIES

PONDCYPRESS

Pondcypress *(Taxodium distichum* var. *nutans* (Ait.) Sweet) *(15)*, a variety of baldcypress, closely resembles baldcypress in botanical as well as silvical characteristics. Typical specimens of each are readily identified by their leaf characteristics, but in the areas where both varieties occur, they intergrade to such an extent that it is often difficult and sometimes impossible to distinguish the two.

Pondcypress — also called pond baldcypress, black cypress, and cypress *(15, 16)* — is not as widely distributed geopraphically as baldcypress. The pondcypress range extends from southeastern Virginia to southern Florida and southeastern Louisiana (fig. 1). This tree is confined to the shallow ponds and wet areas of the Coastal Plain, and it generally does not grow in river and stream swamps *(15, 16, 23, 24)*.

Pondcypress grows under a limited range of climatic conditions, and is found only in the warm, humid climate of the Atlantic and Gulf Coastal Plain of southeastern United States.

It occupies the shallow ponds and poorly drained areas in the flatwoods of the Coastal Plain, and is rarely encountered in the floodplains of large rivers. The soils in these ponds are usually fine sands, although in some areas there may be a marl underlain by limestone *(7, 13, 16, 21)*. The altitudinal distribution of pondcypress is not as great as that of baldcypress. Most stands are found at elevations of less than 100 feet *(16)*.

Pondcypress is often the predominant tree in shallow ponds. Swamp tupelo and baldcypress are its principal associates, and pond pine, spruce pine *(Pinus glabra)*, and both varieties of slash pine are associated with it at pond borders and in slightly elevated positions within the pond *(16)*.

The seed, seeding habits, and vegetative reproduction of pondcypress are apparently very similar to baldcypress *(16, 30)*. In shallow ponds both soil and water conditions appear singularly favorable for pondcypress seed germination and early growth, for here natural reproduction is almost always uniformly abundant *(16)*.

Although little information is recorded about the growth rates of pondcypress, general observations indicate that the tree does not attain the age and large size of baldcypress, nor does it grow as fast. The smaller size and slower growth of pondcypress may be inherent or caused by poor site conditions under which the tree grows. Mattoon *(16)* points out that: "Experiments seem to show that seed from the slow-growing 'pond' form will produce inferior stock to that grown from seed from thrifty trees favorably situated."

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